CLAIMS

What is claimed is:

1. An apparatus for the controlled dynamic braking of a first DC motor operating as a tape supply motor in a tape transport device and coupled to a supply-motor control circuit, the apparatus comprising:

a power-fail detection circuit for detecting a low power event in any of at least one primary power supply providing power to the supply-motor control circuit;

a pulse width modulation (PWM) state device, comprising:

a plurality of state transition paths, each path having an initial state representative of a predetermined range of tape velocities, relative amounts of tape on each reel, an initial tape tension, and at least one subsequent state;

a first input coupled to receive a trigger signal from the power-fail detection circuit indicative of a low power event;

a second input coupled to receive a profile signal indicative of a present tape profile; and

an output for transmitting a PWM signal to the supply-motor control circuit; and

an energy storage device coupled to provide power to the PWM state device during a low power event;

wherein:

upon receipt of the trigger signal and in response to the profile signal, one of the plurality of state transition paths is selected and an associated PWM signal, following the selected state transition path, is transmitted to the supply-motor control circuit; and

current generated by the motion of the tape supply motor is selectively sunk in accordance with the transmitted PWM signal, thereby creating a decelerating force while substantially maintaining the initial tape tension.

2. The apparatus of claim 1, wherein the initial tape tension is determined from at least one of a tape velocity and a relative volume of tape on a tape reel.

3. The apparatus of claim 1, further comprising a control register coupled to the PWM state device and operable to receive control signals comprising:

state signals indicative of a present tape profile;

a load signal operable to latch the control signals into the control register.

4. The apparatus of claim 3, the control signals further comprising an enable signal to trigger dynamic braking of the tape supply motor in the absence of a low power event.

5. The apparatus of claim 4, wherein the control signals are transmitted by a microprocessor.

6. The apparatus of claim 3, wherein:

the control signals are transmitted by a microprocessor; and

the apparatus further comprises a buffer coupled between the microprocessor and the PWM state device for protecting contents of the control register against alteration in the event of a low power event.

7. The apparatus of claim 3, the tape transport device further including a second DC motor operating as a tape take-up motor coupled to a take-up-motor control circuit, wherein:

the apparatus further comprises means for determining which of the first and second DC motors is operating as the tape supply motor; and

the control register is further operable to receive a motor-select signal indicative of which DC motor is the tape supply motor.

8. The apparatus of claim 1, wherein:

the supply-motor control circuit comprises a power switch for each winding of the tape supply motor; and

the PWM signal modulates the power switches.

9. A magnetic tape drive, comprising:

a tape head for detecting information magnetically encoded on a tape medium;

first and second tape reel motors for transporting the tape medium across the tape head, wherein:

the tape moves in a forward direction when the first motor is operable as a tape supply motor and the second motor is operable as a tape take-up motor; and

the tape moves in a reverse direction when the first motor is operable as the tape take-up motor and the second motor is operable as the tape supply motor;

first and second motor control circuits coupled respectively to drive the first and second tape reel motors, each motor control circuit including a plurality of power switches operatively coupled to a corresponding plurality of motor windings;

at least one primary power supply couple to provide current to the first and second motor control circuits;

a control register operable to receive control signals comprising:

a plurality of configuration signals collectively indicative of a present tape profile, including a tape velocity, relative amounts of tape on each reel and an initial tape tension;

a motor-select signal indicative of which of the first and second motors is presently operable as the tape supply motor;

a pulse width modulation (PWM) state device, comprising:

a plurality of state transition paths stored within the PWM state device, each path having an initial state representative of a tape profile, and at least one subsequent state;

a first input coupled to receive a trigger signal from the power-fail detection circuit indicative of a low power event;

a second input coupled to receive a profile signal indicative of a present tape profile; and

an output for transmitting a PWM signal to the supply-motor control circuit coupled to the present tape supply motor;

external programming interface for transmitting a load signal to the control register when a low power event in any of the at least one primary power supplies is detected, wherein the control signals are latched into the control register;

an energy storage device coupled to provide power to the PWM state device during a low power event;

first and second switching devices operatively coupled respectively to the first and second motor control circuits, the first and second switching devices each having:

a normal state whereby the first and second motor control circuits are in a normal operating mode;

a first power-fail state in which the PWM signal is transmitted to the first motor control circuit whereby current generated by the motion of the first motor is selectively sunk in accordance with the transmitted PWM signal following a state transition path having an initial state corresponding most closely to the present tape profile, thereby creating a decelerating force while substantially maintaining an initial tape tension; and

a second power-fail state in which the PWM signal is transmitted to the second motor control circuit whereby current generated by the motion of the second motor is selectively sunk in accordance with the transmitted PWM signal following a state transition path having an initial state corresponding most closely to the present tape profile, thereby creating a decelerating force while substantially maintaining the initial tape tension.

10. The tape drive of claim 9, further comprising a microprocessor coupled to the control register and operable to transmit the control signals to the control register.

11. The tape drive of claim 10, the control signals further comprising an enable signal to trigger dynamic braking of the tape supply motor in the absence of a low power event.

12. The tape drive of claim 9, further comprising:

a microprocessor to transmit the control signals; and

a buffer coupled between the microprocessor and the PWM state device for protecting contents of the control register against alteration in the event of a low power event.

13. A method for dynamic braking of a DC motor in a tape drive, comprising:

storing a plurality of state transition paths into a pulse width modulation (PWM) state device, each path having an initial state representative of a tape profile, including a predetermined range of tape velocities, relative amounts of tape on each reel, an initial tape tension between a supply reel and a take-up reel, and at least one subsequent state;

operating a DC motor in a normal mode;

monitoring at least one voltage coupled to provide power to a motor control circuit;

receiving a profile signal representative of a current tape profile;

receiving a power-fail signal;

transmitting the profile signal into a pulse width modulation (PWM) state device;

comparing the then-current tape profile to a plurality of predetermined ranges of tape velocities, relative amounts of tape on each reel and a tape tension;

selecting from the plurality of state transition paths the state transition path having an initial state which includes the then-current tapeprofile;

transmitting a PWM signal to the motor control circuit, the PWM signal responsive to the selected state transition path;

wherein current generated by the motion of the DC motor is selectively sunk in accordance with the transmitted PWM signal, thereby creating a decelerating force while substantially maintaining the then-current tape tension.

14. The method of claim 13, further comprising receiving an enable signal to trigger dynamic braking of the DC motor in the absence of a low power event.

15. The method of claim 13, further comprising buffering the PWM state device to protect the contents against alteration in the event of a low power event.

16. The method of claim 13, wherein the PWM signal modulates power switches in the motor control circuit associated with windings of the DC motor.